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Encope), from the campanularian hydroids; and the Trachomedusae (e.g., Liriope) and Narcomedusae (e.g., Cunina), from the 'trachylarian' hydroids. The resemblances between the Acraspedae and the Craspedotae, and the similarity between the various orders

of Craspedotae, he believes to be due to secondary modification, rather than to inheritance by descent from a common ancestral medusa.

He regards the Ctenophorae and the Siphonophorae as divergent stems from the Anthomedusae.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Astronomical applications of photography.—Prof. E. C. Pickering described some photographic work which is now being undertaken at the Harvard observatory. Experiments are being made with various lenses, and on their completion it is intended to take photographs of the whole visible heavens north of 30° south. It is possible, also, that a map will be published. Measurements of the photographic energy of all the brighter stars will be made, down to, perhaps, the seventh magnitude. Besides this, it is proposed to obtain measurements of the color of the stars by using a large lens of heavy flint-glass, giving as much chromatic aberration as possible. In the centre a circular disk of glass will be placed, slightly thinner at one edge than at the other. The effect will be, that every star will have two images placed side by side. By adjusting the sensitive-plate at a certain distance from the lens the blue rays will be brought to a focus; but, in the case of the image formed by the rim of the lens, the violet and ultra-violet rays will be spread over so large an area as to produce comparatively little effect, while in the other image they will have nearly full power. By placing another plate somewhat nearer the lens the violet rays will be focused. A third plate will enable us to focus the ultra-violet rays. By comparing, in each case, the image formed by the edge of the lens with that formed by the centre, a series of quantitative results can be obtained, which will vary according to the spectrum of the star measured. By this method any variations of color as well as of magnitude could at once be detected. — (*Amer. acad. arts sc.; meeting Feb. 14.*) [412]

MATHEMATICS.

Riemann's theory.—The present paper, by Prof. Klein, is a continuation and generalization of the methods and results in his memoir, which appeared a year ago, entitled *Ueber Riemann's Theorie der Algebraischen Functionen*, etc. This last contained an extension of the Riemann theory of functions to arbitrarily given closed surfaces. There exist over these surfaces, as the author shows by physical considerations, certain potential functions, the relations between which, expressed in the language of analysis, afford the sought properties in the theory of functions. The physical considerations at first employed in order to obtain tentative results are now abandoned, and the author develops his new theory by more rigorous methods. Instead, now, of considering a Riemann's surface as a closed surface, he regards it as a *bounded surface*, or aggregate of bounded surfaces, where the different portions of the bounding curves may be regarded as being connected in pairs by any assigned law. A so-bounded surface is regarded as a portion of a closed surface; and the author shows how an important general principle is obtained, which he calls the principle of analytical develop-

ment, and which, in certain special cases, coincides with a principle of Schwarz called the principle of symmetry. The author shows how, by certain particularizations of the ideas, a general notion may be obtained of those functions which have linear transformations among themselves; and a theory is then given of single-valued functions of this kind. The author speaks of a Riemann's manifold, instead of a Riemann's surface, and considers a closed two-dimensional manifold instead of a closed surface, and, upon this manifold, single-valued definite differential expressions, instead of simply the element of length. Numerous references are given to the earlier literature of the subject, in which the investigations of Poincaré stand out most prominently. The present memoir, taken with the previous one above referred to, constitutes one of the most important additions that has ever been made to Riemann's theory of functions. — (*Math. annalen*, xxi.) T. C. [413]

Functions of two variables.—M. Poincaré gives a generalization of a theorem of Weierstrass concerning functions of one variable. The theorem in question is, "If $F(x)$ is a meromorphic function over the entire plane, it can be placed in the form of a quotient of two integral functions." M. Poincaré seeks to find the analogous theorem in the case of two variables, and considers a function, $F(X, Y)$, of two imaginary variables ($X = x + iy$, $Y = z + it$). Calling u the real part of a function of X and Y , it is seen that u satisfies a differential equation ($\Delta u = 0$) where

$$\Delta = \frac{d^2}{dx^2} + \frac{d^2}{dy^2} + \frac{d^2}{dz^2} + \frac{d^2}{dt^2};$$

u also satisfies certain other partial differential equations of the second order, which need not be written down. Any function satisfying the equation $\Delta u = 0$ is called a potential function. The aggregate of points satisfying the inequality

$$(x - x_0)^2 + (y - y_0)^2 + (z - z_0)^2 + (t - t_0)^2 < r^2$$

is called a hyperspheric region. The author constructs an infinite number of hyperspheric regions, and considers a point (xyz) as belonging to at least one of these regions, and being common to not more than five of them. The final theorem obtained is as follows: if Y is any non-uniform function of X ,—which has no essential singular points at a finite distance, and which cannot, for the same value of X , take an infinite number of values infinitely near to each other,—it can be considered as the solution of an equation, $G(X, Y) = 0$, where G is an integral function. — (*Comptes rendus*, Jan. 22.) T. C. [414]

PHYSICS.

Mechanics.

Motion of a pendulum.—M. Lipschitz, in a letter to M. Hermite, investigates the motion of a heavy body capable of turning freely about a horizontal axis.

Let M be the mass of body; N , moment of inertia about the axis; Z , distance of centre of gravity of body from the axis; g , acceleration of gravity; θ , angle of rotation, which is 0 when body is at rest. The motion is considered, first, under the condition that the angular velocity vanishes for the value θ_0 of θ , and, secondly, under the condition that the angular velocity vanishes for the value $\pi - \theta_0$ of θ . If t and t' denote the times in these two cases, then

$$\frac{1}{2} N \left(\frac{d\theta}{dt} \right)^2 = ZMg (\cos \theta - \cos \theta_0),$$

$$\frac{1}{2} N \left(\frac{d\theta}{dt'} \right)^2 = ZMg (\cos \theta + \cos \theta_0).$$

M. Lipschitz expresses t and t' in terms of elliptic integrals of the first species, and proceeds to find the corresponding integrals (w and w') of the second species. He points out that these represent quantities to which Hamilton gave the name *accumulated living force*; that is to say, in each case the element of the integral is equal to the sum of the living forces of the system multiplied by the element of time. He shows that if T and T' , W and W' , denote the values of t and t' , w and w' , corresponding to the passage of the body from the state of rest (when θ equal 0) to the state when θ is a maximum (which is θ_0 in the first case, and $\pi - \theta_0$ in the second case), then

$$TW' + WT' = 2\pi N.$$

Whence it appears that this expression, involving the four quantities T , T' , W , W' , for the two assumed conditions of motion of the same body, has a value depending solely upon the moment of inertia of the body. — (*Comptes rendus*, Dec. 4, 1882.) G. A. H. [415]

Changes in the teaching of mechanics.—M. Yvon Villarceau observes, that what is usually and vaguely termed 'rational mechanics' might with more propriety be called 'general mechanics,' following the example of M. Resal. The science, in M. Villarceau's method of treating it, is based on two principles,—the equation of the motion of a material point projected upon a fixed arbitrary line, and the principle of action and re-action. In treating problems which involve the *liaisons* of points, a certain rule, often neglected, should always be observed. This rule consists in determining the values of all the forces which are eliminated in effecting the solution of the problem, so that we may know whether they are compatible with the properties of the matter of which the bodies are composed; e.g., the intensities of the forces ought not to exceed the limits of the resistance, strings ought not to be subject to a compression, etc. From failure to observe this rule, contradictory results may be reached in the case of certain problems; although all the theorems employed in the solution are incontestably true. As an illustration, M. Villarceau considers the motion of a solid of revolution turning about its axis of symmetry, and left to itself. He is led to the conclusion that the study of the motion of a geometrical solid left to itself ought to be excluded from general mechanics. — (*Comptes rendus*, Dec. 26, 1882.) G. A. H. [416]

(Photography.)

Quantitative photographic measurements.—In connection with the above article a paper was read by Mr. W. H. Pickering, describing some experiments on the absolute sensitiveness, and other important characteristics, of photographic dry plates. As a standard of sensitiveness, ordinary white filter-paper, which is salted and sensitized in standard solutions, was selected. No toning or fixing is employed after the exposure; and the amount of light

absorbed by the exposed portions is measured by a photometer by gaslight. The paper and the plates to be compared are exposed altogether to the direct light of the sky, shining through diaphragms. The plates are then placed in a standard developer for a given time, and fixed. They are next measured by the photometer, and the per cent of light absorbed by the exposed portions determined. The amount of light necessary to darken the paper and each plate 50 per cent is calculated; and the reciprocals of the ratios of these amounts then give the absolute sensitiveness of each plate in terms of the paper taken as a standard. This sensitiveness was found to vary between one and ten million for the various plates measured. It was shown that the plates most sensitive to faint lights were by no means necessarily the most sensitive to high ones, and that those most fogged by gaslight were not proportionately so when exposed to the light of the sky. It was found, that if we expose one portion of a plate to a standard light for a standard time, and then expose another portion to n times the light for an n th the time, the same result will be obtained. The largest value of n employed was 500; but, if the law holds for all values, it can be shown that an average plate exposed to direct sunlight will be darkened perceptibly by an exposure of $\frac{1}{100,000,000}$ part of a second. The relative sensitiveness of the paper and plates may perhaps best be illustrated by the fact that to take a photograph of a landscape under ordinary conditions requires an exposure of about five seconds. Now, to take the landscape under the same conditions on sensitive paper directly would require an exposure of a little over one year of continuous sunlight, day and night. Measurements were made of the amount of contrast obtainable by the different plates, and also of the range of light through which they would give gradations of shading. Great differences were found to exist in them, and several peculiarities in the development of the plates measured were noted. — (*Amer. acad. arts. sc.; meeting* Feb. 14.) [417]

Bicarbonate-of-soda developer.—A developer very popular in Europe at present is that recommended by Mr. John McKean,—a cold saturated solution of bicarbonate of soda, 1 ounce; liquid ammonia (.880), 1 ounce; water, 4 ounces.

A few drops of the above in a three-grain solution of pyro. will develop any good plate with less exposure, and with more detail in the shadows, than has ever yet been secured with the use of bromide. If the shadows are not as clear as may be desired, increase the proportion of bicarbonate. One or two drops of nitric acid in the hypo. solution dispel any trace of fog that may exist after a forced development, in the case of under-exposure. — (*Phot. times*, Jan.) W. H. P. [418]

Carbonate-of-soda developer.—A very popular recent American developer is that given by Mr. H. J. Newton. Stock solution No. 1: carbonate of soda, 500 grains; water, 10 ounces. Stock solution No. 2: pyrogallie acid, 20 grains; oxalic acid, 30 grains; water, 10 ounces.

Take equal parts of the above solutions, thoroughly mixed, and flow over the exposed plate, which has first been laid in water for a minute or two. If the plate should be over-exposed, add a few grains of bromide of ammonia; if under-exposed, use a stronger solution of soda. Instead of oxalic, we may use glacial phosphoric acid (1½ grains to the ounce) or concentrated formic acid (4 grains to the ounce). These acids give rather better colored images than the oxalic, but, even in large cities, are sometimes difficult to obtain. — (*Phot. times*, Feb.) W. H. P. [419]

Electricity.

Rotatory effect of terrestrial magnetism.—In 1878 H. Becquerel showed that the rotatory influence of terrestrial magnetism on light traversing gases could be accurately measured. The fundamental experiment consists in arranging upon the same horizontal support, movable about a vertical axis, a source of light, a polarizer, a column of the substance to be investigated, and an analyzer mounted upon a divided circle. The axis of the column and of the beam of light is placed in the magnetic meridian, and the plane of polarization noted: the apparatus is then turned end for end; the plane of polarization is still the same, but the divided circle has been turned about, so that the apparent rotation is reversed. The effect was multiplied by successive reflection from mirrors at the end of the column of gas, and also by interposing a thin crystalline plate, which rotated the plane of polarization symmetrically about the axis of the crystal.

The author found that the plane of polarization of the luminous rays, D, is rotated through .9435° in traversing 1 metre of CS₂ at 0° C. under the influence of terrestrial magnetism, and that between two points 1 cm. distant, in a magnetic field of strength unity (c. g. s.), the rotation of the same rays in passing through CS₂ at 0° C. is .0463 ± .0004. Thus he claims he can measure, by an optical determination, the intensity of any magnetic field whatever to 1/100 of its value. — (*Ann. chim. phys.*, Nov., 1882.) J. T. [420]

Electric discharge in rarefied air.—Edlund continues his investigation of this subject. He connects the combs of a Holtz machine by means of a wire interrupted by a short air-space. The circuit contains in multiple arc a sensitive galvanometer, and a rarefied-air space, 5 mm. long, between aluminium electrodes. The galvanometer is also shunted by a wire; and one junction of this shunt with the rest of the circuit is grounded. When the Holtz machine is worked, frequent sparks pass, and the galvanometer-needle finally attains a nearly constant deflection. The singular fact is observed, that this deflection is many times greater, when the galvanometer is shunted by the rarefied-air space, than when it is not so shunted. The explanation proposed is, that, after each spark from the Holtz machine passes through the rarefied-air space, a 'disjunction,' or reverse current, is set up by the e. m. f., which the discharge has generated at the surface of the electrodes. This current passes through the galvanometer in the same direction as the current from the machine.

Edlund's articles seem to be of value in calling particular attention to the long-recognized resistance at the surface of the electrodes in a discharge-tube, thus making it appear probable that the proper resistance of rarefied air has been overestimated, and so tending to remove the difficulty at present felt in regard to the height of auroras. Edlund's own conclusion—viz., that empty space, or rather the ether, is an excellent conductor—will probably be accepted by few. — (*Phil. mag.*, Jan.) E. H. H. [421]

ENGINEERING.

The Corinth canal.—As early as the year 625 B.C., the idea of connecting the gulfs of Corinth and Aegina by means of a canal was conceived. It was abandoned after some discussion, from the belief that the level of the sea in the gulf of Corinth was higher than that in the gulf of Athens. Later, Julius Caesar, Caligula, and Nero employed engineers to plan this work; but little was actually accomplished. Quite recently Gen. Türr obtained a concession from

the Hellenic government to cut a canal across the isthmus, of dimensions sufficient to pass one vessel at a time; the cross-section being the same as that of the Suez Canal, i.e., 72 feet wide at the bottom, and with a depth of 26 feet. Three several routes were surveyed, being respectively 3.94 miles, 4.2 miles, and 6.8 miles in length. The first of these lines was selected, being the same as that proposed by Nero's engineers. The work was commenced last May, the estimated cost being thirty million francs. It is believed that the investment will be a good one, as the traffic across the isthmus is now from five to six million tons annually. — (*Engineering*, Dec. 8, 1882.) G. L. V. [422]

The Kinzua viaduct.—This remarkable structure carries a branch of the New-York, Lake-Erie, and Western railroad, over a deep gorge in western Pennsylvania, the Kinzua Creek. This is the highest railroad-bridge in the world, the distance of the rails above the stream being 301 feet, while the whole length of the work is 2,052 feet. The structure is designed to sustain a continuous line of the heaviest locomotive engines from one end to the other, or 2,660 tons in all. The original conception of a viaduct at this place is due to Mr. O. W. Barnes, C. E. The execution has been made under the general direction of Mr. O. Chanute; the details being arranged and the construction carried out by Messrs. Clarke, Reeves, and Co. of Philadelphia. The total cost of this enormous structure was but \$237,000, and the time occupied in building was only 94 days. The towers were erected without scaffolding of any kind, while the superstructure was placed in position by means of a travelling crane; a method which secured economy of both time and money. Especial care has been taken to enable the structure to resist the severest gales of wind. Ample provision, too, has been made for the effect of heat and cold upon the iron-work. — (*Engineering*, Dec. 22, 29, 1882.) G. L. V. [423]

Centrifugal pumps.—The common objection to this kind of pump is, that it wastes a large percentage of the power applied; but G. Kapp of London maintains, that, if the pump is rightly made and rightly worked, it will utilize as large a percentage of the applied work as any hydraulic machine. He gives the mathematical theory of the centrifugal pump, shows how to find the loss through friction, investigates the best form for the wheel-blades, and lays down general rules for the construction throughout. — (*Civilingenieur*, heft 4, 1882.) G. A. H. [424]

CHEMISTRY.

(General, physical, and inorganic.)

Formation of natural manganese binoxide, and certain reactions of other peroxides.—From the results of M. Berthelot, it seems that the heat of formation of Mn O₂ in the reaction Mn O + O = Mn O₂ is larger by 3.9 cal. than that of Mn CO₃ in the reaction CO₂ (in solution) + Mn O = Mn CO₃. An explanation is thus found for the formation of the mineral pyrolusite by the action of air, either free, or dissolved in water. In the reactions 2 Fe O + O = Fe₂O₃, + 13.3 cal. for Fe O; 3 Fe O + O = Fe₃O₄, + 10.3 cal. for Fe O; CO₂ (in solution) + Fe O = Fe CO₃, + 5 cal. (or, CO₂ (gaseous), + 7.8 cal.),—more heat is evolved in the formation of the oxide than of the carbonate. The stability of Ba CO₃ is shown in the reactions Ba + O = Ba O, + 6 cal.; Ba O + CO₂ = Ba CO₃, + 28 cal. Hydrogen peroxide cannot be formed from Mn O₂, since there would be an absorption of heat: Mn O₂ + H Cl = Mn Cl₂ + H₂O₂, —9.7 cal. It cannot be formed from ferric oxide, since the quantity of heat absorbed would equal —16 cal. With

barium peroxide, heat is evolved: $\text{Ba O}_2 + 2 \text{H Cl} = \text{Ba Cl}_2 + \text{H}_2\text{O}_2$, + 11 cal. — (*Comptes rendus*, xcvi. 88.) C. F. M. [425]

Electric conductivity of silver chloride, bromide, and iodide. — W. Kohlrausch finds that silver salts of the halogens offer less resistance to an electric current than sulphuric acid. In the order of their conducting-power, the chloride stands first, the iodide last, and the bromide occupies an intermediary position. — (*Ann. chim. phys.*, xxvii. 642.) C. F. M. [426]

Antiseptic character of carbonic-dioxide gas. — In an atmosphere of this gas, H. Kolbe finds that the quality of fresh beef can be preserved for several weeks, even in a warm room. Fish, game, mutton, and veal begin to decay after a few days. — (*Journ. Prakt. chem.*, n.f. xlv. 249.) C. F. M. [427]

Investigations on uranium. — For the atomic weight of uranium, the values 120, 180, and 240 have been proposed, the latter appearing in Mendelejeff's classification. In order to decide which of these values is correct, C. Zimmermann determined the vapor density of the tetrabromide and tetrachloride, and the specific gravity and specific heat of the metal. Vapor density of the tetrabromide obtained, 19.46; calculated for U Br_4 ($\text{U} = 240$), 19.36; of the tetrachloride obtained, 13.3; calculated for U Cl_4 ($\text{U} = 240$), 13.21. The metal was prepared by ignition of a mixture of the chloride with sodium covered with salt. Specific gravity, 18.7; atomic volume, 12.84; specific heat of the melted metal, 0.02765. This value multiplied by the atomic weight (240) gives, as the atomic heat, 6.64; the law of Dulong and Petit requiring 6.64. Uranium must therefore occupy a position in the sixth group of the periodic system with chromium, molybdenum, and tungsten. — (*Ann. der chem.*, 216. 1.) C. F. M. [428]

Heat of formation of volatile organic bodies. — The heat of formation of such compounds as carbon tetrachloride, chloroform, and perchlorethylen has not been determined, on account of the great difficulty of obtaining complete combustion. In the combustion of compounds of chlorine and carbon containing a small percentage of hydrogen, Julius Thomsen obtains accurate results by burning the volatile substance, mixed with hydrogen, in a special form of apparatus, which he has devised for this purpose. Thomsen concludes from his results, that carbon possesses an equally strong affinity for hydrogen and chlorine. The heat of formation of ethylen and perchlorethylen are nearly the same; and, assuming 14,130 cal. as the most probable value of the double bond between the carbon atoms, the affinity of a hydrogen atom for carbon would be 15,080 cal., and that of a chlorine atom, 14,330 cal. — (*Berichte deutsch. chem. gesellsch.*, xv. 2996.) C. F. M. [429]

Constitution of carbonic acid. — Since a solution of carbonic dioxide in water dissolves magnesium with evolution of hydrogen, M. Ballo concludes that it contains the hydrated acid H_2CO_3 . As a further proof, he mentions the fact that potassium and sodium bicarbonates dissolve magnesium, forming the carbonate $\text{MgCO}_3 \cdot 3 \text{H}_2\text{O}$. The formation of magnesium sulphite, by the action of SO_2 in solution upon the metal, indicates the hydrated acid H_2SO_3 . — (*Berichte deutsch. chem. gesellsch.*, xv. 3003.) C. F. M. [430]

MINERALOGY.

Jade. — Two specimens, — one from the Karakash valley, southern Turkistan, from a mine formerly worked by the Chinese; the other from New Zealand, — upon analysis, gave C. L. Allen results agreeing with amphibole. — (*Chem. news*, xlv. 216.) S. L. P. [431]

Cryolite. — A review of the history of the fluorine minerals, especially those occurring with cryolite from Greenland, is given by P. Groth along with results of renewed crystallographic and chemical investigation. Crystals of cryolite, after having been identified and measured, were given over for chemical analysis to J. Brandl, whose results agreed very closely with the composition expressed by the formula 3Na F , Al F_3 . The results of the renewed crystallographic measurements prove the mineral to be monoclinic with the axial relation $a : b : c = 0.9662 : 1 : 1.3882$. $\beta = 89^\circ 49'$. The optical department of the mineral also indicates its monoclinic character. — (*Zeitschr. kryst.*, vii. 375.) S. L. P. [432]

Hörsesite. — Accompanying nagyagite from Nagyag, M. E. Bertrand has identified crystals of a pale rose color, very soft, and easily cleavable in one direction, which, upon chemical examination, proved to be a hydrated arseniate of magnesia containing a little calcium and manganese. The mineral is supposed to be identical with the hörsesite described by Haidinger. — (*Bull. soc. min.*, v. 306.) S. L. P. [433]

PHYSICAL GEOGRAPHY.

Former great tides. — Prof. R. S. Ball, in a second lecture on this question, reviews the criticisms of his previous statements, and repeats his belief that the accumulation of the oldest stratified rocks was very probably aided by this newly discovered and very important agent; namely, the stronger tides produced by the moon when not so far from the earth as it now is. — (*Nature*, Dec. 28, 1882.) W. M. D. [434]

Gulf-Stream. — Commander Bartlett's recent measures on the coast-survey steamer Blake show that the current off Florida, where the channel is 48 miles wide, and the deepest point 439 fathoms, has a cross-section of 429,526,240 \square feet; a velocity from one to five, averaging three miles an hour; a discharge of 51,000,000,000,000 gallons an hour; and a temperature varying from 78° to 83° at the surface, and from 57° to 44° at the bottom. Farther along our coast, the current flows over an even plateau, narrowing toward Cape Hatteras, about 400 fathoms deep, and suddenly dropping off to over 2,000 fathoms at its eastern edge. In the stronger parts of the stream, the bottom is swept clean, and consists of firm coral rock, hard enough to dent the brass cylinder of the sounding-apparatus. Where fine deposits occur, south of Charleston, they are of pteropod ooze, characteristic of the Caribbean and Gulf of Mexico; farther north, globigerina ooze becomes more common, as it is in the open north Atlantic. The division between these two deposits is considered the boundary of the cold, arctic current which follows down our shore from the north, passing under the Gulf-Stream off Hatteras, where the shallow plateau forces it out. No warm and cold bands or bifurcations were found in the surface-waters till off Hatteras, and no distinct 'cold wall.' Near shore the current was much influenced by winds. A brief description is given of the Siemens deep-sea thermometer, based on the variation of electrical resistance in metals with change of temperature. Measures made with this and with the Miller-Casella thermometer show almost absolute agreement, even at considerable depths. — (*Bull. Amer. geogr. soc.*, 1882, 69. Further account of Bartlett's work may be found in *Proc. U. S. naval inst.*, vii. 1881, 25; viii. 1882, 221.) W. M. D. [435]

GEOGRAPHY.

(Europe.)

French census of 1881. — After deducting the number of foreigners temporarily resident in France,

estimated at about 1,000,000, Chervin finds that the population increased with extreme slowness, or even remained stationary, when compared with the enumerations of 1872 and 1876. Departments showing an increase have grown by immigration. Decrease of population is found even in some of the rich and well situated departments, as parts of Normandy; and the same districts show a large percentage (40 or 50) of rejections from the conscripts for recruiting the army. Both these marks of a lack of healthy growth are ascribed to the effects of drunkenness, which is unfortunately prevalent in some of the communes of this region. — (*Comptes rendus soc. géogr. Paris*, 1883, 40.) W. M. D. [436]

Geographic work in Spain.—According to a summary by Ferreiro, the geographical and statistical institute of Spain have the past year determined the force of gravity at Madrid, and the latitude and longitude (telegraphic) of Madrid and Bajadoz. The difference of level between the Atlantic and Mediterranean is found to be +0.6625 metre: for more accurate determination of this in the future, automatic temperature, pressure, and wind registers have been established at Alicante, Santander, and Cadiz. — (*Bot. soc. geog. Madrid*, xiii., 1882, 317.) W. M. D. [437]

(*Atlantic Ocean*.)

Cape Verde Islands.—This seldom-visited group was examined by Dr. C. Doelter of Graz in the autumn of 1880. The islands do not consist exclusively of volcanic rocks, but contain also gneiss, mica and clay slates, and limestones, lending support to the view that they make part of a continental mass once of considerable extent. Their former direct connection with the mainland is, however, questionable, as the opposite shore of Africa does not contain similar formations in their latitude. (A connection would seem more probable north-eastward to the Atlas range.) Doelter's geological results are given in *Die vulkane der Kapverden und ihre producte* (Graz, 1882). This is to be followed by a general narrative including his journey to western Africa, with the title *Nach den Kapverden und dem Rio Grande* (Leipzig, Froberg). — (*Peterm. mitth.*, 1883, 72.) W. M. D. [438]

Atlantic Soundings.—The brothers Siemens have established a broad reputation by their technical as well as scientific work, ranging from their copper-works in the Caucasus to the construction of cables and telegraph-lines through oceans and wildernesses, as well as to practical researches in electricity. It has not, however, been generally known, that, since 1874, they have undertaken deep soundings in the North Atlantic from one of their own vessels, in connection with their work of cable-laying. Their results have lately been published (Stanford, London) in three charts, giving a valuable addition to our knowledge of the relief of the sea-floor in the cable-zone between Ireland and Newfoundland. The soundings were made with Sir William Thomson's steel wire apparatus, and, by repeated measures in the same place, are found accurate within a few fathoms, even in depths of two miles. The charts are of limited areas; one including the 'Faraday Hills,' N. lat. 49° 20' to 50°, W. long. 28° 30' to 30° 15'; the other two, in the region of the Vlámic cape, east of the Newfoundland banks. — (*Peterm. mitth.*, 1883, 39.) W. M. D. [439]

The 'Travailleurs' cruise in 1882.—Lieutenant Parfait reports that the *Travailleuse* spent July and August of last summer in following near the coast of Spain and Morocco as far as the Canaries, and

back by Madeira to Lisbon and Rochefort. The weather was much worse than was expected; but 71 dredgings were made in depths from 50 to 1,800 fathoms. The 100-fathom plateau was found along the northern coast of Spain, with a width of about twenty miles; beyond its border the depths were very variable, as had been the case in the previous cruises. With this rapid change of depth, the character of the bottom changed also, and the fauna was local. Off Morocco, the bottom was more even, and was covered with a soft reddish mud; the fauna was new and interesting. Among the Canary islands the depths were variable; the bottom was almost barren of life, and was strewn with volcanic dust and ashes. By Madeira, the dredge was often brought up torn by the corals on the bottom. — (*Comptes rendus, soc. géogr. Paris*, 1883, 55, map.) [An account of the outfit and previous soundings of the *Travailleuse* is given by Milne-Edwards (*Bull. soc. géogr.*, 1882, 93.)] W. M. D. [440]

BOTANY.

Cryptogams.

Marine algae of Germany and Austria.—The first three parts of the second volume of Rabenhorst's *Kryptogamen-flora* contain an account of the marine algae of Germany and Austria by Hauck, illustrated with numerous and excellent woodcuts, showing the structure of the fronds and fruit of the different genera, and three full-page photolithographs of species of Corallineae. The parts already published include the lower orders of Florideae, from Porphyraceae to Cryptonemiaceae. The descriptions are clear and full, and the synonymy carefully arranged; and the work will be of great value to American algologists, as it gives the best comprehensive account of the European genera of red seaweeds, the greater part of which have representatives on our own coast. — W. G. F. [441]

Reproduction in Saprolegniaceae.—The *Botanische zeitung* contains a reply of DeBary to the remarks of Pringsheim in the *Berlin Monatsbericht*, in which he questioned the accuracy of some of DeBary's statements in his work, *Beiträge zur morphologie der pilze*, heft 4. DeBary regarded those forms in which ripe spores were produced in oogonia without the intervention of pollinodia (which, in most of the species, make their way into the oogonia) as instances of apogamy, and considered that the forms in question were originally derived from some form having proper pollinodia, but had gradually lost their sexuality. Even in the species of *Achlya* in which pollinodia are present, DeBary failed to see any direct communication between the contents of the oogonia and pollinodia. Pringsheim, on the other hand, describes bodies which he calls spermamoebae, which are contractile masses of protoplasm formed in the pollinodia, and which may be discharged through the walls of the pollinodia without any apparent opening, and unite at once with the oospheres when the pollinodia are in the oogonium; or, in case they do not reach the oogonia, as in some species of *Achlya*, the spermamoebae are discharged into the water, and then make their way into the oogonia. In the *Botanisches centralblatt*, Zopf maintains that Pringsheim's spermamoebae are amoeboid parasites. DeBary believes, that, even on the supposition that the spermamoebae are not parasites, there are species of *Achlya* and *Saprolegnia* in which sexuality is entirely wanting, and that one cannot assume, as Pringsheim has done, that, in the forms in which the oospores are produced without any apparent formation of pol-

linodia, a fertilization is accomplished by means of spermamoebae produced from antheridia remote from the oogonia. DeBary again shows that it is not true, as Pringsheim maintains, that the spores produced, as he calls them apogamously, differ from others in the duration of their resting-period. — (*Bot. zeit.*, Jan., 1883.) — W. G. F. [442]

Phenogams.

Leafy berries in *Mitchella repens*. — Monstrous fruits of partridge-berry, from the valley of Cayuga lake, have been studied with attention by Prof. Dudley, who gives several good figures of the malformations. The following statement shows that the cases possess more than ordinary interest: "The true peduncle has entirely disappeared; and those parts of the petioles coming in direct contact with the berry have become part of it, and have readily assumed its color, texture, and general aspect. But this union has not interfered with the fruitfulness or development of the ovary; the seeds being present, and the size of the berry not being under the average." — (*Torrey bot. bull.*, Jan., 1883.) G. L. G. [443]

Fertilization of *Asclepias cornuti*. — The structure and development of the asclepiad flower have been restudied by Mr. T. H. Corry, who stated the result of his work before the Linnean society Dec. 21, 1882. Self-fertilization, with the parts *in situ*, is believed to be impossible. — (*Nature*, Jan. 11, 1883.) W. T. [444]

Dichogamy of *Pelargonium*. — Professor Barnes points out the protandry of the lemon-scented geranium, *P. graveolens* (*Botan. gazette*, Jan., 1883). In this respect the genus is a very homogeneous one. — W. T. [445]

Pollination of *Arum italicum*. — Dr. Kraus, who has recently studied at Rome the rise of temperature observable in the spathe of this aroid, finds that the maximum is reached between four and six P.M., when it may exceed the temperature of the surrounding air by 27.7° C. At this time the stigmas of the pistillate flowers are receptive, and the spathe opens to allow the entrance of small diptera, which are attracted by the warmth and shelter offered. If they have previously escaped from older spathes, they bring pollen to fertilize the mature pistils. Their escape is prevented by a whorl of rudimentary stamens, as in *A. maculatum* and some spathes of *Arisaema triphyllum*. The temperature gradually falls until morning, when each stigma, having wilted, emits a drop of nectar that is greedily eaten by the flies. The stamens now dehisce, and the insects, pollen-laden, escape to visit other young spathes later in the day. — (*Abhandl. naturf. gesellsch. Halle*, xvi.; fide *Kosmos*, Dec. 30.) W. T. [446]

ZOOLOGY.

Polyps.

Operculate corals. — G. Lindström has just issued an important memoir on the operculiferous corals of the paleozoic formations, illustrated with nine fine plates. He divides them into two groups, — Calceolidae and Araeopomatidae; the former containing Calceola, Rhizophyllum, and the recently described Platyphyllum Lindström (upper Silurian of China), — all with opercula of a single valve, — and Gonophyllum, with an opercular apparatus of four pieces. None of the species are new; though Platyphyllum sinense has barely entered into paleontological literature in the fourth volume of Richthofen's 'China.' The second family contains the new genera Areopoma and Rhytidophyllum; the former proposed for Cystiphyllum prismaticum Lindström (1868), from

the Silurian of Gotland, and the latter for R. pusillum, a new species from the same formation. A broken operculum from Lerberget, not named, is believed by the author to represent a new genus of the same family. Remarks follow on Pholidophyllum and Syringophyllum. Chelodes Dav. & King, a very problematical genus, is referred to as probably Chitonoid. The text (ninety-four pages) is in Swedish. Twenty-one species are illustrated. — (*Svensk. vet. akad. handl.*, vii. iv., 1882.) W. H. D. [447]

Mollusks.

European land-shells. — The first supplement to the second edition of Kobelt's catalogue of the European land and fresh-water mollusk-fauna is just published. It is presented in the shape of a systematic catalogue of species, with synonyms, locality of publication, and habitat, for each of the additions, which are very considerable. Most of the real additions are from the Caucasian region, the borders of the western Mediterranean, Italy, and Sardinia, and are due to Boettger, Kobelt, Paulucci, Lessona, and Pollonera. To Locard and Bourguignat we are indebted for an extraordinary number of new names, applied to variations and varieties of well-known species. The amount and character of the current literature of this topic may be imagined from the fact that this supplement contains about twenty pages of new names supposed to be valid, and five pages of pure synonyms.

In the same issue appears an article by H. Tschapeck, on the varieties of Clausilia dubia found in Steiermark. — (*Nachr. blatt. malac. ges.*, 1883.) W. H. D. [448]

Shells from the Colorado region. — Mr. Stearns has recently received from Indio, Colorado desert, a most interesting lot of Physae, collected by Prof. George Davidson. They intergrade perfectly with one another, connecting *P. humerosa* with *P. heterostropha*, and these with *P. virgata*, etc. Recent data also carry the distribution of *Anodonta californiensis* two hundred and fifty miles east of the main stream of the Colorado river. — W. H. D. [449]

Variations of *Pompholyx*. — A calcareous deposit occurs in Pyramid lake, Nevada, consisting chiefly of incrustated pine-needles and shells of *Pompholyx effusa*. These last vary widely from the original type, showing all grades of costation from perfectly smooth to strongly costate, as in *Vorticifex*; these being the form named costata by Hemphill. Others show decided inclination to become umbilicated, thus verging toward *Carinifex* and its allies. — W. H. D. [450]

Worms.

A cave-dwelling Planarian. — Under the provisional name of *Vortex cavicolens*, Dr. A. S. Packard, jun., describes a Turbellarian from X cave of the Carter caves, Kentucky. The animal is white, about four millimetres in length, and in the alcoholic specimen no eyes could be observed. There is but a single genital outlet near the posterior extremity. — (*Amer. nat.*, xvii. 89.) C. S. M. [451]

Hamingia artica, a rare gephyrean. — This rare worm was known only from three specimens. Lankester has now had an opportunity of examining two others, one of which he dredged himself last summer at forty fathoms, on a rocky bottom off Ler-vik. Lankester's specimen had a proboscis, or frontal hood, which he supposes to have been broken off in Koren and Danielssen's original specimen, as they consider its absence characteristic. In the liquid of the body-cavity exist corpuscles impregnated with

haemoglobin. Lankester's second specimen had only one genital papilla and orifice, instead of two, and contained five males, which live, as in *Bonellia*, as minute parasites on the female. The male is provided with a pair of large genital setae, although such are wanting in the female. — (*Ann. mag. nat. hist.*, xi. 37.) C. S. M. [452]

Myriapods and arachnids.

The blastopore and mesoblast of Peripatus. — The late Prof. Balfour was engaged, just before his death, upon a monograph on the anatomy and development of *Peripatus*, and left a series of notes, completed manuscripts, and drawings, which it is intended to publish in the Quarterly journal of microscopical science for April next. Some of the results have been presented as a preliminary note to the Royal society of London.

The results are briefly as follows: that a widely-open slit-like blastopore is formed in the early oval embryo. The blastopore, which occupies the median ventral line, becomes closed in its centre, an anterior portion remaining open as a mouth, while a posterior portion apparently becomes the anus. The mesoblast is formed from the endoderm at the lips of the blastopore, and makes its appearance as a series of paired hollow outgrowths from the cavity of the archenteron. — (*Journ. microsc. soc. Lond.*, Feb., 1883, 52.) C. S. M. [453]

Eyes of Scorpio and Limulus. — E. Ray Lankester and A. G. Bourne have investigated the minute structure of the eyes in *Limulus* and *Scorpio*, and conclude that the results, which are given in detail and with elaborate illustrations, confirm the opinion previously expressed by Lankester, that the scorpions and king-crabs are closely allied representatives of the class Arachnida. The compound lateral eyes of *Limulus* are compared with the lateral groups of simple eyes in scorpions, and found to agree in the most essential points. The central eyes of *Limulus* are found to agree still more closely with those of scorpions. — (*Quart. journ. microsc. sc.*, Jan., 1883.) S. I. S. [454]

Insects.

The scales of Coleoptera. — Mr. George Dimmock described the scales, or scale-like hairs, of a number of beetles, and considered the effects of scales on the coloration of these insects, and the modes of coloration of scales themselves. Scale-like hairs of *Cicindela*, *Psiloptera*, *Anthrenus*, *Hoplia*, *Polyphylla*, *Valgus*, *Chalcolepidius*, *Alaus*, an undetermined genus of European *Elatridae*, *Ptinus*, *Clytus*, and *Entimus*, were described. This adds the *Elatridae* and *Cerambycidae* to the families which were already recorded as sometimes owing their figuration to a scale-covering. The influence of air in producing silvery and milky whiteness in insects and in their scales was also discussed. The author adopted Dr. H. A. Hagen's division of the colors of insects into 'optical' and 'natural' colors of two sorts, — 'dermal' and 'hypodermal,' — and gave a table of treatment with reagents, to enable one to distinguish these colors in scales under the microscope. As far as examined, scales of *Lepidoptera* owed their coloration to optical and hypodermal colors; scales of *Coleoptera*, to optical and dermal colors; although too much stress must not be put upon the differences between dermal and hypodermal colors. The paper, which will appear in full in *Psyche*, was illustrated by numerous figures and microscopic preparations. In conclusion, a mode of collecting together scales, or other minute objects of similar nature, on a microscope slide, was exhibited.

This consists in putting the scales in a drop of some quickly evaporating substance — chloroform is best for most purposes — on the slide. The scales will form in a kind of whirlpool, nearly all the scales finally settling down, as the liquid evaporates, in one place on the slide. This mode of operating is very convenient; and, by inclining the slide gently, the mass of floating scales can be made to settle on the exact centre of the glass. One part of Canada balsam to several hundred of chloroform will cause them to stick to the slide. — (*Cambr. ent. club; meeting* March 9.) [455]

Mimicry of humming-birds by moths. — The striking resemblance in size, form, and movements, of the South-American *Macroglossa Titan* to humming-birds, which has been noticed by Bates, Fritz Müller, and others, and referred to the similarity in their habits, is believed by Dr. Krause to be a case of protective mimicry; the moths benefiting by their resemblance to the birds, which have few winged enemies. The closeness of the resemblance is supposed also to protect the moths from the humming-birds, which always give chase when they recognize them. To do away with an objection that might be urged from the similar appearance of European *Macroglossae*, which have no *Trochilidae* to imitate, it is assumed either that these birds occurred in Europe in late tertiary times, or that the moths are recent importations from the new world. — (*Kosmos*, Nov.) W. T. [456]

(*Economic entomology.*)

The regulative action of birds upon insect oscillations. — The question "Do birds sometimes vary their diet so far as to neglect their more usual food, and take extraordinary numbers of those species of insects, which, for any reason, become superabundant for a time?" is answered by Prof. Forbes in a very conclusive manner. He selected an orchard which had been for some years badly infested by canker-worms; shot a considerable number of birds therein for two successive years (54 birds of 24 species the first year, and 92 birds of 31 species the second year), representing nearly all the kinds seen in the orchard; made full notes of the relative abundance of the species; examined carefully the contents of the stomachs obtained, with reference not only to the presence of canker-worms, but of all other insects as well; and tabulated the results. The summaries on these tables are brought into comparison with those derived from birds of the same species shot in ordinary situations during the same month. Thirty-six species of birds were taken in the infested orchard. 72% of the species, and 60% of the specimens, had eaten canker-worms. 35% of all the food eaten by all the birds was canker-worms. The comparisons made between the food of these birds and that of birds shot in other situations show, that the large proportion of the food which the canker-worms constituted, in one case was compensated by a general diminution of the ratios of all the other kinds of food, and not by a neglect of one or two alone. Hence the birds, in checking the increase of the canker-worm, were not tending to allow an undue increase of any other species of insect. — (*Bull. Ill. state lab.*, No. 6, Dec., 1882.) J. H. C. [457]

Corn-root worm. — The eggs of *Diabrotica longicornis* have been discovered by Prof. Forbes. They are laid in September and October in the ground upon or about the roots of corn, and probably do not hatch until the following May or June. The best means of checking the increase of this insect is, therefore, rotation of crops. — (*Prairie farmer*, Dec. 30, 1882.) J. H. C. [458]

VERTEBRATES.

Discovery of the blood-circulation.—From a careful study of the works of Colombo, and a comparison of dates, Tollin concludes that Colombo was not an original discoverer of the pulmonary circulation, but merely appropriated the work of Servetus. —(*Arch. path. anat. phys.*, xci. 1883, 39.) H. N. M. [459]

Internal polarization of nerves.—As the result of experiments carried on in Lovén's laboratory, Tigerstedt concludes, that, when the polarizing current is opened, the polarization instantaneously reaches its highest value, and then continuously decreases. The decrease is at first rapid, then falls more and more slowly; so that polarization still remains long after the opening of the polarizing current, and only asymptotically approaches the zero point. —(*Mitt. physiol. lab. Carol. inst. Stockh.*, i., ii., 1882.) H. N. M. [460]

Action of the intercostal muscles in breathing.—Lukjanow has made fresh observations on this long-disputed subject. In his experiments, rabbits and dogs were used; the breathing of the former being mainly diaphragmatic, that of the latter chiefly costal. On examination of the intercostal spaces, exposed by removing the skin and the pectoral muscles, he found that the changes in their width during inspiration depended on the thoracic region observed. The upper two or three intercostal spaces were narrowed in inspiration; the lower three or four, widened; the intermediate remained unchanged. The phenomena were the same in forced and in quiet breathing, and essentially alike in rabbit and dog, though more conspicuous in the latter animal. Moreover, during artificial respiration, the same changes in the widths of the various intercostal spaces were observed as in normal breathing. The author concludes, that it is most probable that the view of Henke and Brüche is correct, in accordance with which the intercostal muscles have no proper duties as muscles, but simply form an elastic membrane, enclosing the thorax. Very considerable difficulties oppose the acceptance of this view, and these Lukjanow to some extent recognizes. He concludes by stating that the full explanation of the phenomena observed by him cannot be given until all the respiratory movements of the ribs have been separately investigated. —(*Pflüg. arch.*, xxx. 1883, 82.) H. N. M. [461]

Tarsus of birds and dinosaurs.—This paper by Georg Baur forms an important contribution to our knowledge of the resemblances of the tarsus of birds to that of dinosaurs, especially *Compsognathus*. The tarsus of birds as shown by embryos is composed of a tibiale, fibulare, and a piece representing tarsals 1-5; the latter ankylose with met. 2-4, and the two first with the tibia. Contrary to the observations of Prof. E. S. Morse, the ascending process is held to be a rather late product, but an integral part, of the tibiale. By an extended study of the tarsus among the dinosaurs, he finds the following points of resemblance to birds: 1°. That the tibia and fibula become slim in embryo birds in the same way as in the evolution of dinosaurs. 2°. The similar blending of fibulare and tibiale, and the position of the fibulare under the tibia. 3°. The blending of the first row with the tibia in both cases. 4°. The morphological relations of the ascending process: this is small or absent in early dinosaurs, and is slowly evolved. 5°. The resemblance of the development of the metatarsals in birds to the evolution of the same parts in dinosaurs. 6°. The similar decrease in the number of the toes. —(*Morph. Jahrb.*, 1882, 417.) J. A. J. [462]

Permian fishes and reptiles from Texas.—Professor E. D. Cope exhibited some specimens of fishes and reptiles from the Permian formation of Texas. One of these was a new species of Crossopterygian fish, which he named *Ectosteorhachis cicronius*. It exhibited some important characters of the posterior cranial region. The base of the skull consists of ossified parachordals; and these embrace the chorda dorsalis posteriorly, and are continued for a short distance posteriorly as a tube. Anteriorly the chordal groove is open. He considered the cranial structure to be an excellent illustration of a permanent embryonic type.

The most interesting reptile was a new genus which occupies a place between the Pelycosauria with molar teeth and those with raptorial teeth, but with more resemblance to the former, or *Diadectidae*. The teeth are placed transversely in the jaws, but the crowns terminate in an incurved apex, without ledge. He named the genus *Chilonyx*, and referred it provisionally to the *Bolosauridae*. The typical species is the *Bolosaurus rapidens*,—an animal with a skull as large as that of a terrapin, and with robust limbs. The surface of the skull is divided by grooves into numerous swollen areas; and some of these on the lateral occipital region are developed to tuberosities, like the rudimental horns of *Phrynosoma Douglasi*. —(*Acad. nat. sc. Philad.*; meeting March 6.) [463]

Reptiles.

Dinodipsas, a new venomous snake.—Professor E. D. Cope drew attention to a recent important discovery, made by Prof. Peters of Berlin, of a new genus of venomous snakes, *Dinodipsas*. The speaker stated that he regarded the genus as pertaining to the *Causidae*,—a family he had proposed as a subfamily in his first paper read before the Academy in 1859. As *Causus*, the only genus heretofore known, is African, the statement of Peters, that *Dinodipsas* is South American, adds an important fact to geographical zoölogy. Prof. Cope then corrected a statement made by Peters in his herpetology of the *Reise nach Mozambique*, that he (Prof. Cope) had referred *Causus* to the vipers. In 1859 he had divided the venomous snakes with vertical and hinged maxillary bones into the subdivisions of the rattlesnakes, the vipers, the *Atractaspines*, and the *Causines*. He then designated the entire group *Viperidae*, after Bonaparte, and had not until later used Dumeril and Bibron's terminology. This did not, however, justify Peters in stating that he has referred the genus *Causus* to the vipers, and that he (Peters) was the author of a separate family, the '*Vipernattern*,' to receive that genus and *Dinodipsas*. —(*Acad. nat. sc. Philad.*; meeting March 5.) [464]

Mammals.

On *Halichoerus gryphus*.—Nehring, basing his remarks upon the result of an examination of a full-grown male gray seal, captured at Goehren, island Rügen, gives some valuable information in regard to the species. The intestines of the Goehren specimen, which measured 38 metres, i.e., 17 times the length of the animal, were filled with partially digested fish-vertebrae, and immense numbers of the nematoid worm, *Ascaris osculata*. A comparison of skulls in the museums of the universities of Greifswald and Berlin shows that great variation exists; making it probable that the three species of *Halichoerus* recognized by many zoölogists represent but the variations of a single one. The presence of six molars, either on one or both sides of the upper jaw, in 8 out of 34 skulls examined, is noted, and is regarded as representing a tendency to reversion rather than an abnor-

mality or monstrosity. The general principle is laid down, that the number and form of teeth in mammals are no less subject to modifications than the amount or color of pelage, the length of the ear or tail, or the proportions of the skeleton. The article closes with remarks on the proportions of the skeleton, and the geographical distribution and abundance of the species. The author inclines to doubt the opinion broached to him by Gerst cker; namely, that the gray seal is the most abundant species in the Baltic. — (*Sitz.-ber. gesell. naturf. fr. Berl.*, 1882, 117.) F. W. T. [465]

Mammals as weather-prophets. — Dr. C. C. Abbott showed that the autumnal habits of certain animals that are popularly supposed to be indicative of the character of the coming winter could not be depended upon; although, by the majority of people living in the country, they were considered as sure indications of what the winter would prove to be. Dr. Abbott had kept a careful record, extending over twenty years, regarding the building of winter houses by muskrats, the storing of nuts by squirrels, and other habits of these and other mammals, and had found that the habits referred to, or their omission, in certain autumns, bore no relation to the character of the coming winter. — (*Trenton nat. hist. soc.; meeting* Feb. 13.) [466]

ANTHROPOLOGY.

Ethnography of Kordofan. — Dr. Peney, physician-in-chief of eastern Soudan, sends to Dr. Hamy of Paris a description of the inhabitants of Kordofan. The country is held principally by Arab tribes; and even the negroes were converted to Islamism under that great revival which subjected all northern Africa to the faith of the Prophet. The class of fakirs, or revivalists, is very graphically described, and their power over the natives. A custom of allowing the females of the tribe to do just as they please one day in four, exists among the Hassanichs. — J. W. P. [467]

The religions of savages. — M. A. Reville is the author of a work upon the religions of peoples non-civilized, published in Paris by Fischbacher. Mr. A. Lang, reviewing this work, criticises the author for relying too much upon older authorities and upon mere compendiums, but gives him credit for seeing the true import of many superstitions of lower races that have no reason for us. — (*Academy*, Jan. 13.) [468]

Brains of great men. — Gen. Skobelev, the hero of Plevna, after death was subjected to a rigorous autopsy. The circumference of his head was 57 centimetres; of the skull, 54; antero-posterior diameter, 18 centimetres; transverse, 14. The brain weighed 1,457 grms. The brain of Gambetta is deposited in the laboratory of the school of higher studies, and will be described by M. Mathias Duval of the Society of mutual autopsy, to which M. Gambetta also belonged. — J. W. P. [469]

Woman among the Kabyles. — The indigenes of Algeria are among the most interesting portions of the human family. As specimens of humanity, as a composite ethnic residuum, as the repository of features in civilization that have long since been wanting among those with whom they originated, the Berbers have attracted a wide attention. The Kabyles are the modern Berber representatives of the ancient Numidians, familiar to classical scholars in the story of Jugurtha. M. Camille Sabatier has passed some time among these people, and gives us the benefit of his experiences. To those coming from an Arab population, the most striking fact in Kabyle life is the liberty of going and coming ac-

cording to females of all ranks, and on all occasions. Although the poor are very miserable, they are not disheartened; and every care is solaced by a gaudy wrapping, or some tawdry jewelry. "While the birth of a son is an occasion of rejoicing, the daughter is an evil omen. It is only when she arrives at a marriageable (marketable) age, that the parents awaken to a consciousness of her existence. All the forces of her education combine to render her vigorous, servile, and revengeful, and to banish love from her heart. The rite of marriage and of bride-sale are described in the graphic style of an eye-witness, and the future of the Kabyles briefly foretold. — (*Rev. d'anthrop.*, Jan., 1883.) J. W. P. [470]

Mollusks and civilization. — If all the tribes of men were arranged upon the squares of a modern city, so that by walking eastward and westward we could visit the peoples of the whole earth, they could each be so arranged, that, by going northward and southward, the student of special topics might study the phases of his pet pursuit among the various races. Dr. de Rochebrune has chosen this latter method of study, and has taken the word 'mollusk,' or shell, as his talisman. The use of this animal as food, and of its test in art and ornament, has existed among all peoples, ancient and modern. Others have already gone over the ground. — Stearns, Yates, Barber, Wyman, and Martens, for instance; but the author, having enjoyed especial advantages in the museum of the Trocadero, is able to present something new on the subject of ethnographic conchology. The first memoir is upon the mollusks in the graves of lower Peru. The species used for food as well as for ornament are minutely identified. They are twenty-seven in number, and some of them evidently had been brought a great distance. — (*Rev. d'ethnogr.*, No. 6, 1882.) J. W. P. [471]

Mound-builders' pipes. — The curator presented for inspection a collection of thirteen of the 'curved-base' mound-builders' pipes just received from that indefatigable explorer and collector, Rev. J. Gass. These pipes were collected the past year from the mounds in Muscatine, Rock Island, and Mercer counties, by Mr. Gass, his brother, and some neighbors; and he has recently acquired full possession of them for the benefit of the academy, with a full description of the mounds, their structure, etc.

One of these pipes is a finely carved stag's-head, representing the antlers bent around the bowl, and carved in relief; another is an eagle, perched, and holding some small animal in its claws; and two others are neatly carved birds. These four are of ash-colored pipestone. Another is a finely sculptured black bear, and is very appropriately cut in a smooth, fine-grained blackstone. The sixth is supposed to represent a fox with the face turned backward, carved in a beautiful bright red catlinite. The seventh, a non-descriptive animal, is also cut in red catlinite, very much spotted.

Two of plain form are composed of plain red catlinite. The other four are made of a light-brown stone, rather small, and of the simplest form.

There is also an 'axe' of the exact usual form of the plano-convex copper axes, so-called, which is also made of the catlinite, or red pipestone, and a small charm of the same material.

This constitutes a very important addition to this already unequalled collection of the relics of the mound-builders, and brings the collection of pipes of this typical form up to the number of fifty-six, including several unfinished specimens, and by far the largest collection of its kind in the world. — (*Davenport acad. sc.; meeting* Feb. 23.) [472]